

WHAT IS CLAIMED:

Suba 1. In an artificial limb for amputees who have a residual limb, the artificial limb having a pylon, a socket attached to the pylon, a flexible liner having a cavity with a volume less than that of the residual limb, the socket having a volume and shape to receive a substantial portion of the residual limb and the liner, the socket having a cavity between the liner and the socket adapted to receive the residual limb and the liner, a vacuum source connectable to the socket cavity, and a seal means for sealing the socket cavity: a valveless plate/socket attachment for connecting the vacuum source to the socket cavity, the plate/socket attachment comprising:

- a) a plate attached to the pylon and to the socket, the plate having a first surface and a second surface;
- b) a vacuum passage through the plate between the first surface and the second surface; and
- c) a vacuum outlet in the second surface for attachment of the vacuum source.

2. The plate/socket attachment of claim 1, the artificial limb having an inner socket disposed between the residual limb and the socket, the socket cavity being between the liner and the inner socket, and further comprising a shuttle pin receiver in the first surface, the shuttle pin receiver being connected to the vacuum passage, and an O-ring between the shuttle pin receiver and the vacuum passage; and a shuttle pin attached to the inner socket and removably connectable to the shuttle pin receiver to connect the inner socket to the plate/socket attachment, the shuttle pin having a second vacuum passage therethrough, the second vacuum passage being connected to the socket cavity, the shuttle pin engaging the O-ring thereby providing an air-tight connection between the vacuum passage and the second vacuum passage.

3. The plate/socket attachment of claim 1, wherein a vacuum of at least ten inches of mercury is maintained in the cavity.

4. The apparatus of claim 1, wherein the socket has a single wall.

5. The apparatus of claim 1, wherein the seal means further comprises a nonfoamed, nonporous polyurethane suspension sleeve for rolling over and covering the socket and a portion of the residual limb.

6. The apparatus of claim 1, wherein the liner is of a nonfoamed, nonporous polyurethane.

7. The apparatus of claim 1, wherein the seal means further comprises an annular seal between the liner and the socket.

8. The apparatus of claim 1, wherein the vacuum source is a vacuum pump and a regulator to maintain vacuum in the cavity, and further comprising a power source for the vacuum pump and the regulator.

9. The apparatus of claim 1, further comprising a vacuum reservoir having a volume substantially larger than the cavity.

10. The apparatus of claim 1, wherein the vacuum source further comprises a weight-actuated vacuum pump.

11. The apparatus of claim 1, further comprising a thin sheath between the liner and the socket, to assist the even distribution of vacuum in the cavity about the liner.

12. The apparatus of claim 2, further comprising a thin sheath between the liner and the socket, to assist the even distribution of vacuum in the cavity about the liner.

13. The apparatus of claim 2, further comprising: a retention member within the shuttle pin receiver biased against the shuttle pin at an acute angle to a longitudinal axis of the shuttle pin, a retention member spring biasing the retention member, a release member engaging the retention member and moving the retention member to a position substantially perpendicular to the longitudinal axis of the shuttle pin, and a retention member spring biasing the retention member.

14. In an artificial limb for amputees who have a residual limb, the artificial limb having a pylon, a socket attached to the pylon, a flexible liner having a cavity with a volume less than that of the residual limb, the socket having a volume and shape to receive a substantial portion of the residual limb and the liner, the socket having a cavity between the liner and the socket adapted to receive the residual limb and the liner, a vacuum source connectable to the socket cavity, and a seal means for sealing the socket cavity: a valveless plate/socket attachment for connecting the vacuum source to the socket cavity, the plate/socket attachment comprising:

- a) a plate attached to the pylon and to the socket, the plate having a first surface and a second surface;
- b) a vacuum passage through the plate between the first surface and the second surface;
- c) a vacuum outlet in the second surface for attachment of the vacuum source;
- d) the artificial limb having an inner socket disposed between the residual limb and the socket, the socket cavity being between the liner and the inner socket, and further comprising a shuttle pin receiver in the first surface, the shuttle pin receiver being connected to the vacuum passage, and an O-ring between the shuttle pin receiver and the vacuum passage; and a shuttle pin attached to the inner socket and removably connectable to the shuttle pin receiver to connect the inner socket to the plate/socket attachment, the shuttle pin having a second vacuum passage therethrough, the second vacuum passage being connected to the socket cavity, the shuttle pin engaging the O-ring thereby providing an air-tight connection between the vacuum passage and the second vacuum passage.

15. The apparatus of claim 14, further comprising: a retention member within the shuttle pin receiver biased against the shuttle pin at an acute angle to a longitudinal axis of the shuttle pin, a retention member spring biasing the retention member, a release member engaging the retention member and moving the retention member to a position substantially perpendicular to the longitudinal axis of the shuttle pin, and a retention member spring biasing the retention member.